

## SIDE DISCHARGE BAG FOR FLOWABLE MATERIALS AND METHOD FOR DICHARGING FLOWABLE MATERIALS

### CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims priority on U.S. Provisional Application Serial No. 60/459210, filed on March 31, 2003.

[001] The present invention relates to a container for bulk materials and a discharge system for discharge of bulk product from within container.

### BACKGROUND OF THE INVENTION

[002] It has been common practice to pack, transport, and deliver flowable materials, dry particulate or granular materials in bags or containers. Flowable materials include chemicals, polymer additives, minerals, fertilizers, foodstuffs, grains, cement, agricultural products and the like. When large quantities of materials are transported, specialized bulk handling equipment is used. For example, the materials are loaded into a truck, railroad car or barge and then transferred to a hopper or other storage device.

[003] When smaller quantities of flowable materials are handled, a smaller container system is used. The present invention relates to such a container system. The container may be in form of bags, bulk bags, or flexible containers. As disclosed in US Patent No. 5,484,207, bulk transport bags are quite common, and normally such a bag would have a discharge spot extending from the bottom of the bag, which is used to release the materials from the bag. In another publication, U.S. Patent No. 4,143,796 discloses a container bag with a top loading and a bottom discharge.

[004] The prior bag discharge system requires special handling, including the lifting the bulk bags via a folk lift or other means to place into a receiving hopper or for discharge into a hopper. US Patent No. 4,792,171 discloses a special device for picking up container bags using a forklift truck, without the driver having to leave his seat. U.S. patent No. 6,450,754 discloses a discharge system with a bag lifting frame as well as a support frame with support legs. In operation, a forklift or hoist is needed to elevate the bulk bag over the fitting frame. The task of retrieving and emptying the bags requires the use of a forklift for large operations. With small operations, i.e., individual bags are

handled, the operator must often handle the bags separately and manually, lifting, cutting open, and dumping the bags into receiving bins. The prior art approach lends to injuries or strains to the operator in the lifting or hoisting of the bags. It is also time consuming to empty the bags.

[005] The present invention relates to an improved and novel bulk bag design as well as a convenient bulk bag discharge system that facilitates the discharge of flowable materials from such bulk bag.

#### SUMMARY OF THE INVENTION

[006] The present invention relates to a discharge bag for flowable materials having a side discharge spout near the bottom of the bag.

[007] The invention further relates to a discharge assembly, comprising a frame having wheels rotably mounted to the frame for moving the frame over a ground surface to position of a discharge bag containing flowable materials, for supporting the discharge bag and discharging flowable materials contained within the bag.

[008] Lastly, the invention also relates to a method for discharging flowable material from a bulk bag having a side discharge outlet.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[009] Figure 1 is a perspective view of a side discharge bag that embodies principles of the invention.

[010] Figure 2 is a perspective view of a second side discharge bag that embodies principles of the invention.

[011] Figure 3 is a side view of one embodiment of the liner for use with the side discharge bag of the present invention.

[012] Figures 4 and 5 are perspective views showing a discharge assembly with the side discharge bag in operation in conjunction with a discharge frame.

#### DETAILED DESCRIPTION OF THE INVENTION

[013] As used herein, “flexible container” is used interchangeably with “bag,” or “bulk bag,” to refer to the container of the present invention to hold large, heavy quantities of materials, typically one to three tons. The bag of the invention is useful in handling flowable materials which may be moist, coarse, compactable, powder, pellets, granular, and pastilles.

[014] Also as used herein, “discharge assembly” is used interchangeably with “discharge frame,” or “discharge apparatus,” or “frame assembly,” to refer to an apparatus that can be used in conjunction with the side discharge bag of the present invention, to conveniently discharge contents from the bag via the side discharge spout or opening.

[015] Side Discharge Bag. With reference in more details to Figure 1, there is shown one embodiment of the bag of the invention. An intake spout 15 extends upwardly from an unshown opening in the top 17 of the bag 10. Bag has a base or bottom 12 from which four sides or panels 13 extend upwardly. Four lifting straps or loops 19 are attached to the top corners of the sides 13, for use as an attaching means to a discharge assembly. There is an optional lifting strap 14 located about one third of the way from the top 17 to the bottom 12. Side discharge spout (or flap) 16, located at or near the bottom of one of the side, extending from an unshown opening in the side opposite to the side bearing lifting strap 14. Side discharge means 16 has an opening or spout 18, for discharging materials from the bag.

[016] In one embodiment of the invention, the discharge spout is located at the bottom 12 of the bag, i.e., the bottom of the side discharge spout is on the same plane as the bottom 12 of the bag. In another embodiment, the bottom of the discharge spout is at a distance from 1 to 5” from the bottom 12 of the bag. In a third embodiment, the bottom of the discharge spout is at a distance from 0 to 15” from the bottom 12 of the bag.

[017] The discharge spout is kept closed or sealed by fastening means known in the art, e.g., a standard cordlock with spout locking device; a heavy duty cordlock; ties in the form of a wire tie, plastic tie, web tie, or drawstring. In one embodiment of the invention, the side discharge means 16 is in the form of a cylindrical tube with a circular

opening or spout. In yet another embodiment, the discharge means is in the form of a cone shaped discharge tube, i.e., downwardly and inwardly tapering toward a circular spout. In a third embodiment, the discharge means comprises a resealable opening, e.g., by VELCRO hook and loop, thus obviating the need for fastening means to keep the discharge means closed.

[018] In yet another embodiment of the invention, a second set of four (additional) lifting straps / loops of a different size / length than the first set of lifting straps are provided, also attached to the top corners of the sides, to give the operator flexibility in adjusting the height of the bag.

[019] In one embodiment of the invention, also as shown in Figure 2, attachment means are in the form of hooks, S-hooks, or rings 29, used in place of the lifting straps. The hooks or rings are subsequently hooked to or suspended from corresponding hooks or rings of a discharge assembly.

[020] In yet another embodiment of the invention, the attachment means are in the form of at least a hook, a ring, or a strap as part of the tie-string or strap to tie the opening 15 of the bag, which hook or strap is subsequently hung onto or used with a corresponding attaching means of a discharge assembly.

[021] In one embodiment of the invention (not shown), the bag may have a cylindrical shape with a cylindrical surround wall, and with the side discharge spout located near or toward the bottom of the cylindrical bag. In another embodiment, each lift strap includes a lift loop with an optional guide loop at the end of the loop, with the lift strap being shown at the four corner of the cylindrical or rectangular-shaped bag. In yet another embodiment for a bag as shown in Figure 2, to be used with a liner, the bag 20 has an opening (or spout) 22 at the bottom of the bag, for the handling of the liner before or after use for refurbishment of the bag.

[022] Materials of Manufacture of the Side Discharge Bag. The side discharge bag of the present invention is made by any suitable material that provides the strength and support to the materials contained within, e.g., jute, cotton, polyester, or polypropylene, etc. In one embodiment, it is made with a woven material to prevent leaking of the contents. Suitable materials include woven cloths of polypropylene

filaments of suitable filament thickness, for example of 1000 denier; polyvinyl chloride covered polyester filaments, and / or rubber covered nylon fabric. In yet another embodiment, the woven cloth is coated with a mixture of propylene and polyethylene.

[023] Optional Liner. In one embodiment of the invention, the bag further comprises an inside layer or a liner. Liners are often desirable when shipping powdered materials, such as flour or sugar, or chemicals, to prevent the powdered contents from sifting through the porous outer bag, or to prevent contamination of the outer bag, or to provide a moisture barrier or to render the bag capable of containing liquid. The liner can be provided independently or integrally with the bag, i.e., by means of extrusion laminate. Independent liners are often non-reusable. Conventional liners are made of flexible, conductive and non-conductive materials such as polyolefin, polyester, or nylon, that are either tubular, i.e., tube liners, or configured to conform to the shape of the bag, i.e., form fitted liners.

[024] In one embodiment, the liner is a polybutylene film of about 0.5 mil to 4.0 mil thick, being attached to the bag (outer layer) by mean of a resin adhesive. In yet another embodiment, the liner comprises metallized or metallic foil layers.

[025] In one embodiment, a kiss coating of adhesive is applied in a manner known in the art to secure the inner layer and the bag. As used herein, the term "kiss coating" means a conventional process by which a thin layer of adhesive is applied to a surface. In a second embodiment, the liner is sewn into the outer bag at opposing diagonal corner side seams. In another embodiment, the liner may be sewn onto the top and side, or bottom and side panels of the bag. In yet another embodiment, strings are attached onto the liner and tied to the top and bottom corners of the bag to position and hold the liner in place during fill and discharge of the product.

[026] In one embodiment of the invention wherein the liner has a flat bottom and wherein when being discharged, the operator would reach to the liner via the discharge spout of the outer bag and slit the liner with a sharp instrument such as a knife, blade, and the like, allowing the product to flow out of the cut in the liner and through the side discharge spout. In yet another embodiment as shown in Figure 3, the liner 30 has a top intake 31, a body 33 optionally conforming to the size of the bag, and an extra long lower

section or tail 32 which can be folded over the bottom 32 or the side of the bag 30. In a discharging operation, an operator can reach into the liner via discharge spout 18 of the bag to pull out the output tail 22, to discharge material contained in the liner 20.

[027] Discharge Assembly and Method of Discharging. The bag is first loaded or filled with material. In one embodiment with the use of a liner, the bulk bag is first lined with the liner by inserting the liner into the bag via the top intake spout. The now lined bag may now be filled with material fed down through the top opening of the liner protruding from the intake spout. The intake spout as well as the top of the liner may be secured, heat-sealed, tied off or fastened by any fastening means, with a tie, a cord, or a line. The side discharge spout of the bag can be tied off and tuck away to one side of the bag.

[028] In one embodiment of the invention, the side discharge bag as filled with materials is set on a pallet, i.e., near a receiving vessel or hopper. As illustrated in Figure 5, the discharge assembly 50 is manually moved (on its wheels 51) into position straddling the pallet (not shown) and the bag 10, which is in an upright position (vertical orientation). The bag is supported via strap cables and hung in an upright position. The bag then can be emptied via the side discharge spout 18 near the bottom of the bag into a receptacle (not shown).

[029] With respect to the discharge assembly, reference is made to Figure 4 and 5. The loops or lifting straps 19 of the bag 10 are first attached to a support means in the form of a frame 40. Frame 40 can be optionally adjusted vertically up and down rods 52 via a lifting means or leverage means to reduce the strain and work needed by an operator to position the bag onto the frame. As shown in the figure, the frame is adjusted vertically via a pulley / roller 54 by an operator (not shown) via hand crank 53. After bag 10 is stabilized in a desirable vertical position, the side discharge spout is untied or unfolded to expose the opening to discharge materials from the bag. If the materials are contained within a liner within the bag, Operator can reach through the discharge spout opening to cut the liner with a blade in a convenient manner, i.e., an X or inverted U shape, thus allowing material to flow out the side discharge spout. As the bag empties, operator may lift the lifting strap 14 (not shown) to tilt the material toward the front of the bag and out the discharge spout.

[030] In another embodiment of the invention wherein hooks or rings are used on bag to attach the bag (instead of lifting straps 19), frame 40 has built-in loops or rings that hooks on bag 10 can be conveniently hooked onto the frame.

[031] In another embodiment of the invention, the support means is in the form of a ring with built-in notches or hooks for the loops, lifting straps, or hooks of the bag to be correspondingly attached onto.

[032] In yet another embodiment of the invention, instead of a frame, the support means comprises two parallel bars or rods, which can be adjusted vertically up and down rods 52 as well as being tilted up and down of one end of the bars or another, thus allowing the operator to slightly lift one end of the bag (toward the side discharge opening) to allow the bag to be emptied via the side discharge opening.

[033] In another embodiment of the invention, the support means may comprise a hook, a ring, or a notch, being part of or suspended from the lifting device, for the bag to be directly suspended from.

[034] In another embodiment of the invention, instead of a pulley and / or hand-crank, the lifting device for the frame comprises a wench or wenches operationally connected between the frame and the discharge assembly. The wench can be lifted via manual, hydraulic, pneumatic, or electrical means. The wenches may optionally contain small hooks for the lifting straps to be attached onto during discharge.

[035] In one embodiment of the invention, the frame assembly is optionally equipped with a vibrator assembly (not shown in Figures), to promote the flow of bulk material out of the discharge opening / spout upon emptying the bag.

[036] In yet another embodiment of the invention, the discharge assembly is circular in form, i.e., with the support means 40 is in the form of a circular ring.

[037] In one embodiment of the invention, the frame comprises collapsible rods or bars, allowing the frame to be disassembled and moved around easily. In yet another embodiment of the invention, the frame is supported by support means in the form of a 3-sided frame assembly, allowing the frame to be moved to the location of a stationary bulk bag and enclosing the bulk bag via the open side.

[038] In another embodiment, a motor is used to power the wench, allowing an operator to quickly adjust / tighten the wench and speed up the discharge process. Once the bag nears empty, the wench connected to the rear of the bag is tightened to provide a lightly lift of the back of the bag, pouring the material from the bag toward and out of the side discharge spout.

[039] It is thus seen that a flexible container or bag is now provided which may be readily prepared for discharge in a safe and simple manner. There is also provided a discharge system for use with the side-discharge bag of the invention. The bag and discharge system may employ other variations and modifications from those set forth within, without departing from the spirit and scope of the invention as set forth in the following claims.